



# Longwood Gardens

## Greenhouse Plastic Films EGR 7111 Life Cycle Assessment

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### Project Overview

#### Overview

Use a Life Cycle Assessment (LCA) as a tool to investigate what greenhouse covering is least harmful to the environment while still maintaining performance and price.

#### Considerations

- Ability to withstand elements and use
- Financial cost over lifetime
- Maintenance
- Environmental impact over lifetime

#### Primary Options

- Polyethylene (AC/IR)
- Outstanding Durability
  - UV Block & Anti Dust
  - Easy Installation
- Ethylene Tetrafluoroethylene
- Self Cleaning
  - Recyclable
  - Extremely Stretchable

### Analysis

#### Goal

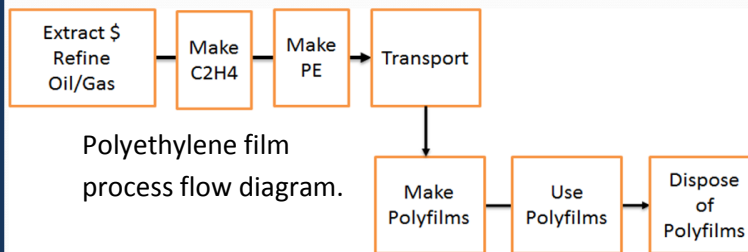
- Analyze the environmental effects of varying materials for use in production green houses.
- Develop a basic understanding of the level of impact of each potential solution from "cradle to grave".

#### Scope

-Three potential options; includes manufacturing, to use, to disposal.

#### Functional Unit

One production green house: 42'x100'



- Used SimaPro software to run simulations for all greenhouse options for varying lengths of use.
- The software accounts for almost all life cycle impacts of each product.

### Conclusions & Recommendation

#### Conclusions

- ETFE is most viable option
- Key advantages include durability, heating cost, and light transmissivity.

#### Recommendations

- Install ETFE on production greenhouse.
- Measure light transmission, heat transmission, and plant growth and use as metric.

#### Further Study

- Water consumption and chemical use for cleaning plastic.
- Use of bio-based plastic instead of petroleum-based.